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COLONIES OF ANTS (*LASIUS NEONIGER* EMERY) INFESTED WITH *LABOULBENIA FORMICARUM* THAXTER.

By William Morton Wheeler.

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It appears, from the exhaustive researches of Prof. Roland Thaxter, the leading authority on the Laboulbeniaceæ, that only two species of these extraordinary ectoparasitic fungi are known to occur on ants. One of these species is *Rickia wasmanni* Cavara, found by Wasmann on *Myrmica levinodis* Nyl. at Linz on the Rhine; the other is *Laboulbenia formicarum* which Thaxter has taken at Cambridge, Mass. on *Lasius niger* L. var. *americanus* Emery and *Formica subpolita* Mayr var. *neogagates* Emery. Both species are described and beautifully figured in the second part of Thaxter's "Contribution toward a Monograph of the Laboulbeniaceæ," Mem. Amer. Acad. Arts and Sci., Vol. XIII, No. VI, 1908, pp. 248 and 359, Pl. XXXIV., Figs. 1-13 and Pl. LVIII, Figs. 14, 15.

For some time I have been looking for Laboulbeniaceæ on the ants which I have collected myself or received from correspondents, but it was not till very recently that I happened on any specimens of these fungi. April 20–24, while collecting insects on the seashore at Ellisville, Mass., a small settlement about twelve miles south of Plymouth and six miles north of Bournedale, I came upon two localities about a mile apart, in which nearly all the colonies of *Lasius niger*, var. *neoniger* were infested with what Professor Thaxter has kindly identified for me as the second of the two species of Laboulbeniaceæ mentioned above, namely *Laboulbenia formicarum.* I first found a number of infested *neoniger* colonies a mile south of Ellisville in a small triangular area about a dozen yards in diameter and adjoining the beach. The soil of this area consists of a mixture of sand and humus and must be well within the reach of the salt spray during stormy weather. A few days later I discovered a much larger area, comprising a narrow strip about a quarter of a mile in length and forming the border of a salt meadow between Salt Pond and the beach at Ellisville. Here there are dozens of infested colonies which have a very definite and interesting distribution. On the beach itself, which consists of a deep layer of pure sand, there are colonies of *Formica fusca* var. *argentata* Wheeler, *Myrmica scabrinodis* Nyl. var. *sabuleti* Meinert, *Tapinoma sessile* Say and *Lasius neoniger*. The last is far and away the most abundant and its workers are of large size. None of the ants in this locality, including the *neoniger,* was found to be infested with Laboulbeniaceæ. On the border of the salt meadow, however, immediately adjoining the beach, where the soil is moist, consisting of a mixture of rather sour, decomposing humus mixed with sand, and probably not infrequently wetted by the spray and occasionally even submerged at very high water, the only ant is *L. neoniger,* but its colonies are less populous than those on the beach, the workers are distinctly smaller and are practically all infested with the *Laboulbenia.* Passing over from this zone of infestation to the pasture land adjoining the salt meadow, the variety *neoniger* is replaced by *L. niger* L. var *americanus* Emery which is the form of the species commonly occurring in higher and dryer pastures and fields. None of the workers of this form, which lacks on the scapes and legs the erect hairs so conspicuous in the var. *neoniger,* was found to be infested with the fungus. It would seem, therefore, that while *neoniger,* unlike any of the other ants, is able to exist in a depauperate condition in the damp, sour soil at the edges of salt meadows, it does so only at the risk of becoming infested with *Laboulbenia formicarum.* Indeed, the infestation of the ants in this strip of littoral at Ellisville is often so excessive that they resemble hedgehogs, fairly bristling with tufts of the fungus.

According to Thaxter, both *Rickia wasmanni* and *Laboulbenia formicarum* grow on all parts of their hosts, but this statement requires some qualification, at least in the case of the latter species. An examination of several hundred specimens of *L. neoniger* shows that the *Laboulbenia* grows most abundantly on the abdomen, middle and hind femora and tibiæ and posterior portions of the head. The thorax and coxæ, as a rule, are entirely free from the fungus;

the clypeus and gula are generally free, and this seems to be invariably the case with the mandibles, antennal funiculi, palpi, labium, maxillæ and eyes. In a very few specimens I have seen one or two of the little plants on the antennal scapes, but, as a rule, these organs are perfectly clean.

Heavily infested workers were seen toiling at their excavations, constructing the craters of the nest and running about as nimbly as uninfested individuals, but the colonies, judging from their rather limited personnel and the reduced number and small size of the craters seemed to be decidedly less prosperous than those of the larger, uninfested form of the same variety on the sandy beach. I excavated a considerable number of the nests of the infested colonies but in only one instance did I find larvæ, and I failed to find any queens, but as larvæ were not seen in the uninfested colonies and as the old queens of all of our species of *Lasius* are very rarely seen in the nests, these negative observations have little significance.

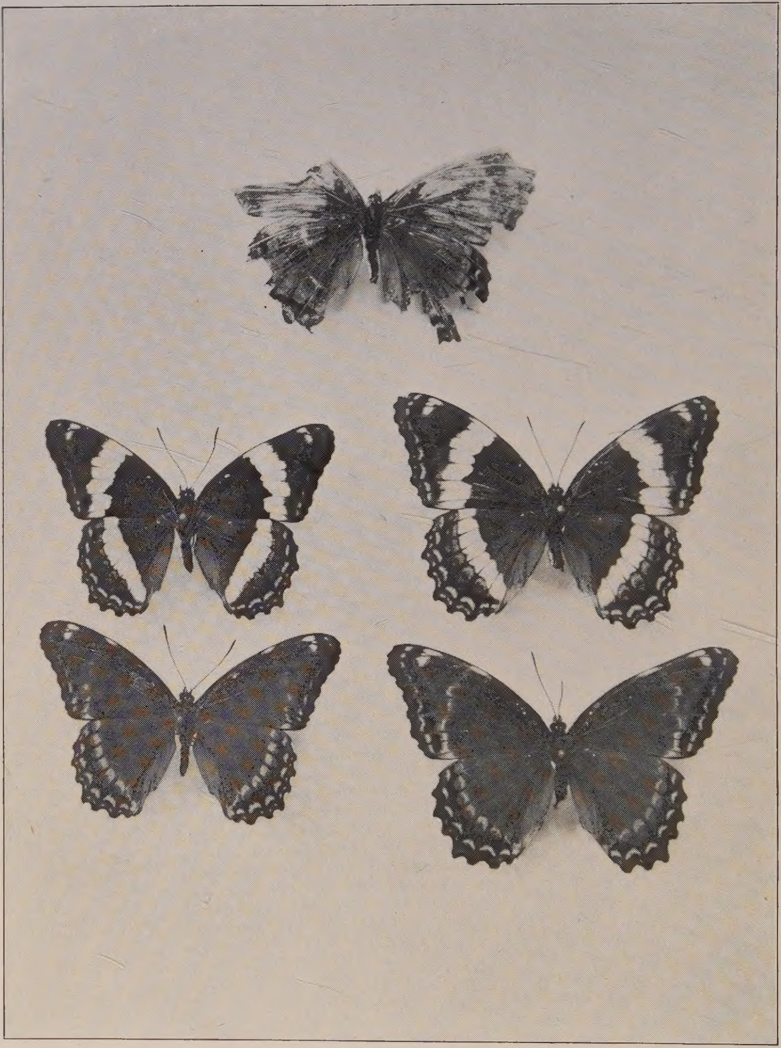
It is strange that this should be the first time in my rather extensive experience in collecting ants, that I have happened on a locality in which the colonies of a species are infested with Laboulbeniaceæ, and it is even more surprising that previous observers have found only two ant-infesting species of these fungi, which are represented by so many much larger and more remarkable forms on other insects. At first sight ants would seem to be particularly favorable hosts for such parasites since these insects are in the habit of huddling together in masses in warm subterranean galleries, where the fungi might be supposed to develop luxuriantly and transmit their spores from ant to ant with great facility. Further consideration of the matter, however, leads to the conclusion that other habits of the ants must, in all probability, tend to suppress or render impossible the development of the fungi, except under unusual conditions such as those in which I found the colonies of *L. neoniger* living at Ellisville. All ants devote a great deal of time and attention to cleaning their own integument and that of their nestmates. They are, indeed, forever combing and scraping the surfaces of their bodies with their tongues and strigils, so that fungi must find it difficult to gain a precarious foothold in their nests, to say nothing of an opportunity to proliferate. And even on the rare occasions, when this happens, important organs like the mandibles, antennæ, labium, maxillæ, palpi and eyes are kept scrupulously free from the parasitic growth. Although, as previously stated, many of the *L. neoniger* bristled with the *Laboulbenia,* there were scattered over their chitinous integument numerous minute black dots representing the points of attachment of fungi that had been completely torn away, either by attrition against the walls of the nest galleries, or more probably, by the strigils and tongues of the ants themselves. The observations at Ellisville indicate that the parasitic fungus can luxuriate only on the members of ant-colonies which have become enfeebled or depauperate through nesting in soil which is too moist, saline or foul, or of an abnormally high temperature when exposed to the sun.

ON THE REPUGNATORIAL SECRETION OF CARABUS VINCTUS.

A rather unexpected occurrence happened at the capture of my first specimen of this species, which I had discovered under some old boards near the Shawshine River in Andover, Mass. I picked it up between the thumb and finger for a closer examination and, when perhaps a foot from my face, heard a slight snapping noise which was followed by the sensation that might be produced by the application of red hot needles to one's face. This intense burning lasted until I bathed my face in alcohol. Since then I have taken two specimens in Framingham and, in each case, noticed the same snapping noise, but as I took good care not to get the insect very near my face, I did not experience the previous unpleasant results.

The elytral edges are strongly reflexed in this beetle and at the apices a slight hollow is formed which would hold a small quantity of the fluid secreted; and when the elytra receive the pressure of the thumb and finger they snap past each other and the resultant spring throws the fluid off in a fine spray.

C. A. Frost.



FIELD—BUTTERFLIES OF THE GENUS BASILARCHIA.

THE OFFSPRING OF A CAPTURED FEMALE *BASILARCHIA PROSERPINA.*

By William L. W. Field,

Milton, Mass.

A female *Basilarchia proserpina,* taken at Springfield, Vt., August 14, 1908, refused to oviposit on the leaves of any available species of birch, poplar, or willow, but when furnished with wild cherry[1] leaves deposited thirty-one eggs, from sixteen of which offspring were reared to maturity. Of these offspring, nine (five males and four females) closely resembled the mother, and seven (four males and three females) were of the white-banded arthemis type, called by Edwards (1879) form *lamina.*

The accompanying plate shows the mother — much the worse for wear after her long captivity — and four of her offspring, a pair of each type. The entire series is now in the Museum of Comparative Zoölogy at Harvard University.

These observations, considered in the light of the Mendelian principles of heredity, give fresh support to the view of Scudder (1889) and others, who have believed *proserpina* to be a hybrid between *arthemis* and *astyanax.* The observed facts accord with those noted by Edwards, who in 1877 reared three *arthemis* and one *proserpina* from eggs deposited by a *proserpina* captured in the Catskill region; and in addition they bring out some new points:

First, the evidence of *proserpina's* hybridity furnished by her choice of an *astyanax* food-plant. In the opinion of collectors generally, the occurrence of a *Basilarchia* larva upon wild cherry plausibly identifies it as *astyanax;* and I find no record of the use of this food-plant by *arthemis.*

Second, some basis for a guess as to the specific identity of her mate. Springfield, Vt., is north of the zone in which *proserpina* ordinarily occurs, and it seems probable that the male parent of this diverse brood was of the *arthemis* (*lamina*) type.

Third, the approximately even division of the offspring between the two types, in a region where *proserpina* has heretofore been unknown, while *arthemis* (*lamina*) is abundant, and always, so far as observation has shown, breeds true.

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[1] *Prunus serotina.*

Edwards (1877, 1879) drew from his observations the conclusion that *arthemis* (*lamina*) and *proserpina* were to be referred to a single dimorphic species, flying in company with *astyanax* along the narrow zone where their ranges overlapped,— indeed dimorphic only in that zone,— yet never interbreeding with the other species. Mendel's work lay buried and forgotten; and no one realized that this dimorphism might under certain circumstances be a criterion of hybridity. The occurrence of other apparently hybrid Basilarchias (*astyanax-archippus* and *arthemis-archippus*) has been recorded (see Scudder, 1889, and Field, 1904), but its full meaning seems to have been overlooked. The cumulative significance of the various published observations of the genus Basilarchia in the eastern United States is contrary to Edwards's interpretation.

Our working hypothesis may now be that *proserpina* is a hybrid between *arthemis* and *astyanax,* in which the dark coloring of *astyanax* incompletely dominates the white band of *arthemis.*[1] In the narrow belt in which the hybrids commonly occur, these heterozygous individuals must often breed together, producing offspring of which 50 per cent. must resemble the parents (*i.e.,* are heterozygotes), while 25 per cent. are pure dominants (*astyanax*) and 25 per cent. are pure recessives (*arthemis*).[2] Farther north, where *astyanax* seems not to thrive, but the recessive white-banded *arthemis* holds sway, occasional stray examples of *proserpina,* mating with *arthemis,* will yield offspring of which 50 per cent. will be *proserpina* and 50 per cent. pure *arthemis.* In this division the Springfield brood probably belongs. South of the zone of hybridization, the white band must be almost swamped; for when *proserpina* mates with *astyanax,* the offspring will all be dark, and half of them will be pure dominants (*astyanax*). The occasional white-banded Basilarchias[3] taken on Long Island or in New Jersey, or in other places south of the usual range of *arthemis,* may be regarded as extracted recessives (*arthemis*), due to the interbreeding of southward-spreading heterozygotes (*proserpina*).

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[1] Such incomplete dominance is a widely-recognized phenomenon in Mendelian inheritance. See Bateson (1909) and Davenport (1910).

[2] The name *lamina* now appears to be superfluous, as we are assuming that there is but one form of *arthemis.*

[3] *Ursula* [=*astyanax*] var. *albofasciata* Newcomb (1907).

Moreover, wherever either *arthemis* or *astyanax* mingles with the widely-distributed *archippus*, we should look carefully for further evidences of hybridization involving that species.

Viewed thus, the Basilarchias of eastern North America constitute a group of unusual interest to students of organic evolution, and supply attractive material for experimental investigation.

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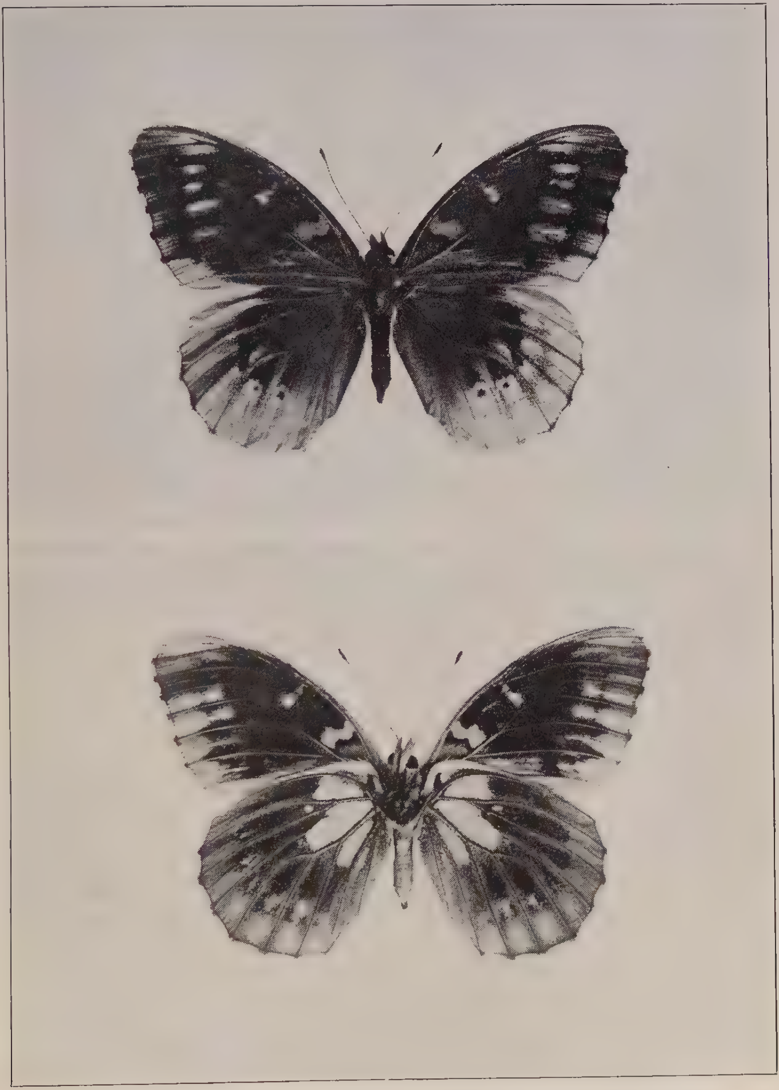
ARGYNNIS CYBELE FAB., VARIETY *BAAL*, STRECK. *MELANIC.*♀

By H. H. Newcomb,

Boston, Mass.

This handsome butterfly so well illustrated on the preceding plate was captured by Dr. S. Graenicher of the Public Museum, Milwaukee, on Aug. 1, 1909, at the junction of the Yellow and St. Croix Rivers, Burnett County, Wis. It was taken on the flowers of the common ox-eye daisy (*Rudbeckia hirta* L.). By comparison with photographs of two specimens of Strecker's *baal,* ♂, ♀, kindly sent me by Mr. F. J. V. Skiff, director of the Field Museum of Natural History at Chicago, it seems to correspond perfectly with those insects except for its melanism. On both sides the colors and shadings are those of *cybele* except for the intense blackness on certain areas as shown by the plate. The clustering of the three large silver spots at the base of the secondaries on the under side produce a marked and beautiful effect. It was my pleasure to see recently a *melanic cybele* ♀ in the collection of Mr. Joseph Mattes, New York City, and also a photograph of another sent me from the Field Museum, which Mr. W. J. Gerhard stated "is one of four specimens from Chicago," but these were quite distinct from the var. *baal* as shown here.

The above specimen is the property of the Public Museum, Milwaukee, and was taken during the collecting expedition sent out from there last summer.



NEWCOMB—ARGYNNIS CYBELE FABR., VAR. BAAL STRECK

SOME BEES OF THE GENUS *NOMADA* FROM WASHINGTON STATE.

By T. D. A. Cockerell.

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Nomada mutans sp. nov.

♀. Length about 7 mm.; black with creamy-white markings, and hardly any hair; anterior coxæ without spines; head and thorax strongly punctured; head broad, with the following light markings: lateral marks, broad below, with a little notch on each side near to black part of clypeus, extending upward above level of antennæ, ending in a rather obtuse point, a little away from orbital margin; lower two thirds of clypeus, the margin of the light area broadly angled in the middle above; labrum, but the lower half suffused with reddish; basal half of mandibles (apical half reddish); and narrow posterior orbits; mandibles simple; second joint of labial palpi much less than half length of first; scape blackish behind, reddish in front, with an obscure yellowish mark; flagellum thick, dark reddish above, light ferruginous below, first joint paler; third antennal joint conspicuously longer than fourth; mesothorax shining between the strong punctures; light markings of thorax as follows: upper margin of prothorax, tubercles, tegulæ, scutellum, postscutellum, and a triangular spot on anterior part of pleura; scutellum little elevated; wings dusky, stigma ferruginous, nervures fuscous; t. m. a short distance basad of b. n.; first r. n. reaching second s. m. well beyond middle; legs black, with creamy-white spots on hind coxæ, apices of femora and apices and bases of tibiæ; anterior legs light ferruginous in front; middle legs nearly the same; hind femora with a reddish stripe; anterior tarsi entirely pale reddish; spurs white; abdomen very minutely punctured, with five entire broad creamy-white bands, the first with a pair of spots; band of silver-white hair on fifth segment rather narrow; venter with light bands.

Var. a. Postscutellum all black; band on first abdominal segment without enclosed spots, but with a ferruginous notch on each side behind.

Var. b. Smaller, length about 5½ mm.; lateral marks not extending above antennæ; scutellum with two large light spots; postscutellum black; fourth and fifth abdominal bands broadly excavated in front on each side.

Hab.— Pullman, Washington State, 1908 (*W. M. Mann*). Two typical, Aug. 9; one var. a., Aug. 9; two var. b., Aug. 9 and 30. A distinct little species, related to *N. verecunda* Cresson, but easily known by its creamy-white markings. The general appearance is suggestive of *N. vierecki* Ckll., but that has red legs. I wished to name this after its discoverer, but there is already a *Nomada manni* Morawitz.

Nomada semisuavis sp. nov.

♂. Length about 9 mm.; black and bright lemon yellow; the anterior coxæ with long spines; third antennal joint much longer than fourth; b. n. meeting t. m. Almost exactly like *N. suavis* Cresson, and possibly only a race or variety, but having the following distinctive characters: *Scape swollen;* lateral face-marks broader above; no black between lateral and supraclypeal marks; second s. m. narrower, receiving the first r. n. at its middle; yellow patch on pleura very large (fully twice as large as in *suavis*); legs seen from in front entirely yellow, anterior and middle femora with a black band behind, middle tibiæ with a black mark behind, hind femora almost entirely black behind, their tibiæ with a large black longitudinal band; last joint of hind tarsi bright ferruginous; *apical plate of abdomen strongly and sharply notched* (entire in *suavis*). *N. suavis* has been referred (Canad. Entom., 1905, p. 283) to *Holonomada,* but it belongs with the new species in the subgenus *Micronomada.* Both have in the male a pair of large yellow patches on the metathorax; Cresson's supposed male of *N. suavis,* without these marks, was probably *N. formula* Viereck.

Hab.— Wawawai, Washington State, July 4, 1908 (*W. M. Mann.*)

Nomada civilis spokanensis subsp. nov.

♀. Length about 11½ mm.; similar to the Corvallis, Oregon, form of *N. civilis,* but differing as follows: Scape wholly light red; tegulæ reddish (instead of yellow); mark on pleura suffused with red, and reduced, its posterior lobe obsolete or almost; yellow on scutellum reduced, with a median black line; metathoracic marks reddish, very small; yellow of legs mainly replaced by red; apical half of first abdominal segment red, with a small obscure yellowish spot on each extreme side; second and third segments very broadly red in the middle. The nervures and stigma are bright ferruginous, and the second submarginal cell has the characteristic broad form, with the r. n. joining it beyond the middle. (The venation indicates its relationship with *N. civilis,* and distinctness from the rather similar *N. vicinalis aldrichi* Ckll.)

Compared with the Colorado form of *N. civilis* it is still more distinct, being much larger, with the bases of the abdominal segments broadly black, all the femora and tibiæ with large black patches behind, etc. In the table of Rocky Mountain species (Bull. 94, Colo. Exp. Sta.) it runs to 62, and runs out because it is a female with black thorax. The hair of the head and thorax above is strongly reddish. The b. n. goes a considerable distance basad of t. m.

Hab.— Spokane, Washington State, May 30 (*W. M. Mann*). Among the European species, this insect has a strong superficial resemblance to *N. ruficornis* (specimen from Buda compared).

Nomada malonella sp. nov.

♂. Length about 7 mm.; head and thorax black, densely and very coarsely punctured, with white hair, which is dull and scanty above, clear white and more abundant below, abundant and shining on lower part of face; head transversely suboval, face very broad, eyes converging below; lower corners of face, extreme lower margin of clypeus and base of mandibles yellow; mandibles simple, apical half ferruginous with the apex black or almost; labrum black, pallid around the margins; *scape stout, wholly black;* third antennal joint shorter than fourth, but more than half its length; flagellum long, rather thick, black above, broadly ferruginous beneath; area of metathorax rugose; *tegulæ dark ferruginous, coarsely rugosopunctate;* wings moderately dusky, the large stigma and nervures dark ferruginous; b. n. going far basad of t. m.; second s. m. broad above; legs red, the femora and tibiæ largely black behind, the posterior ones almost wholly so; hind tarsi largely blackened; spurs white; abdomen narrow, light but dullish red, with fine whitish pubescence giving it a silky appearance; first segment with the basal half black, the other segments a little blackened at extreme base; extreme side of segments 2 to 5, with successively smaller cream-colored spots; segments 4 to 6 with also subdorsal spots; venter with imperfect cream-colored bands, out of which large pieces seem to have been cut at the sides. Allied to *N. elegantula* Ckll. and somewhat to *N. melliventris* Cresson.

Hab.— Wawawai, Washington State, May 1, 1909 (*W. M. Mann*).

A female (date and locality the same) seems to belong here, but may represent another species. It is only about 6½ mm. long, and differs from the male thus: Scape with a red spot at base; third antennal joint almost as long as fourth; thorax with red marks as follows: upper border of prothorax, tubercles, two fine lines on mesothorax, two spots on scutellum, axillar spots, a line on postscutellum, a spot beneath wings, and a transverse mark on lower part of pleura; also other minor details. There is a small red spot above each eye. The upper side of the abdomen agrees with that of *N. angelarum* Ckll.

Nomada malonina sp. nov.

♂. Length about 5¾ mm.; looks at first sight like a small example of *N. malonella,* but differs as follows: Flagellum proportionately shorter; lower margin of clypeus broadly yellow at sides; light parts of legs paler and suffused with yellowish; hind legs black except the knees, and apices of the other joints; t. m. a little basad of b. n.; scutellum less prominent; ground-color of abdomen light yellowish-red; first segment with more than basal half black, the edge of the black rather concave in the middle (projecting to form an angle in *malonella*); fourth and following segments dark with a subapical yellow band; sides of segments 2 to 4 with a broad oblique light yellow band, on 2 and 3 with a dark patch in front; ground color of venter dark, and light bands much broader. In both species the apical plate is strongly notched.

Hab.— Wawawai, Washington State, May 15, 1909 (*W. M. Mann*).

The following table separates the four related species. The venation of *N. melliventris* was kindly noted for me by Mr. Viereck, from Cresson's type.

Basal nervure going far basad of transversomedial................1.
Basal nervure falling a little short of transversomedial.............2.
1. Tegulæ dark reddish; labrum black, except margins; scutellum prominent...**malonella** ♂
Tegulæ yellowish; labrum yellow; scutellum not prominent, **melliventris** ♂
2. Scape with a large red basal patch in front; ground color of abdomen bright coppery-red....................................**elegantula** ♀
Scape wholly black; ground color of abdomen pale yellowish-red **malonina** ♂

Nomada (Gnathias) perplexans sp. nov.

♂. Length about 9 mm.; head and thorax black, with long coarse white hair, which is slightly stained with yellowish above; lower corners of face sending a linear process along orbits nearly to level of antennæ, clypeus except sides above, labrum and basal half of mandibles, all light yellow; *scape entirely black;* flagellum red, the first five joints black above, the others with a blackish band; third antennal joint a little shorter than fourth; thorax densely and strongly punctured, *wholly black except the reddish tubercles;* tegulæ very bright ferruginous; wings strongly dusky at apex; stigma ferruginous, nervures fusco-ferruginous; b. n. going far basad of t. m.; first r. n. joining second s. m. well beyond middle; legs red, the anterior femora black at base behind, the other femora with more black, the hind ones with more black than red; abdomen clear red, first segment with basal half and a pair of spots on apical half black; second segment with a pair of very large pale yellow patches, pointed mesad; sixth with a pair of obscure yellowish spots; apical plate notched; venter red with broad suffused blackish bands. A western representative of *N. perplexa* Cresson, easily distinguished by the much lighter red abdomen.

Hab.— Pullman, Washington State, June 7, 1908 (*W. M. Mann*).

Nomada itamera sp. nov.

♀. Length 8½ mm.; head and thorax coarsely rugosopunctate, with scanty white (yellowish dorsally) hair; black, with the following parts dark red, face below antennæ except a broad black band extending from each antenna to clypeal margin, mandibles (which are stout and blunt, but entire) entirely, labrum, posterior orbits extremely narrowly, a large triangular mark above each eye, a large V-shaped mark on each side of mesothorax, the greater part of the extremely prominent and strongly bilobed scutellum, upper border of prothorax, tubercles, and a very large patch on pleura; antennæ thick, third joint shorter than fourth, scape red in front, flagellum dark red suffused with dusky; tegulæ very bright ferruginous, strongly punctured; wings very dark on apical margin, stigma and nervures dark reddish; b. n. going a moderate distance basad of t. m.; second s. m. large, receiving first r. n. at middle; legs red, the femora with much black, the edges of the black suffused; abdomen broad, dark red, black at base of first segment trilobed, apical margin of first two segments strongly blackened; apical half of abdomen darker, with minute scattered glittering hairs; sides of second segment with a round suffused yellow spot; fourth segment with a pair of subdorsal yellow spots.

Hab.— Pullman, Washington State, May 30 (*W. M. Mann*). There is no sign of yellow at lower corners of face. A probable male of this species is from Wawawai, May 15.

Nomada orcusella sp. nov.

♀. Length 8⅓ mm.; bright ferruginous; head and thorax rugosopunctate; eyes reddish-grey; a keel between antennæ; the following parts are *black,* a large patch on front, including antennal sockets, a small area about ocelli; cheeks posteriorly, a median stripe on mesothorax, a stripe on metathorax, area between wings and middle and hind legs, and region round tubercles; third antennal joint shorter than fourth; scape red; flagellum entirely red; scutellum bigibbous; tegulæ bright ferruginous, punctured; wings strongly dusky, with a hyaline area beyond submarginal cells; stigma dark ferruginous, nervures dark fuscous; b. n. going far basad of t. m.; first r. n. entering second s. m. much beyond middle; legs red, hind femora with much black, the others with some at base; hind basitarsus suffused with blackish; abdomen shining bright ferruginous, the segments not at all dark-margined, first segment black at extreme base and half-way along sides in second segment, with a large yellow spot on each side, third with very small spots; apical segments without yellow; venter without yellow. The mandibles are simple, and there is no yellow at lower corners of face.

Hab.— Orcus Island, Washington State, latter half of July, 1909 (*W. M. Mann*). The following table separates several females of *Nomada* s. str. described from Washington State:

Abdomen without yellow spots........................**kincaidiana** Ckll.
Abdomen with yellow spots, at least on second segment.............1.
1. Metathorax black, except for a couple of hardly visible red spots on enclosure; abdomen with scanty short silvery hairs, shining in certain lights..**itamera** Ckll.
Metathorax red with a central black band; abdomen without shining silvery hairs...2.
2. Abdomen deep chestnut red; wings darker..............**orcusella** Ckll.
Abdomen light red.................................**flammigera** Ckll.

The Nomadæ of Washington State were listed and tabulated by Viereck in Canadian Entomologist, Aug. 1905. A collection received from Mr. W. M. Mann contains not only the new forms described above, but also several others new to the state, so it will be worth while to give a new list, complete to date. I have omitted from it some males of *Nomada* s. str., which probably belong with females already described, but cannot be certainly associated with them at present.

Gnathias.

This group differs from all the others in having bidentate mandibles.

(1.) *N. perbella* Viereck. Hoquiam (*Burke,* fide Viereck); Olympia and Seattle (*Kincaid,* fide Viereck); Wawawai, May 1, both sexes (*Mann*); Pullman, May (*Mann*).

Mr. Mann's specimens have the abdomen dark red, and agree with Viereck's description in both sexes. On this basis, the species seems valid; but the Kincaidian specimens, which I formerly (Proc. Acad. Nat. Sci. Phila., 1903, p. 601) referred to *N. bella* Cresson, have the female paler than in typical *bella,* and do not seem to be *perbella.* More collecting is needed to determine whether there are really two species.

(2.) *N. perplexans,* n. sp. Pullman (*Mann*).

(3.) *N. cuneata* Robertson. Pullman, May (*Mann*). This is not quite typical; from a single specimen I cannot determine whether there is a distinct northwestern race.

(4.) *N. grayi eastonensis* Ckll. Easton.

(5.) *N. washingtoni* Ckll.

Nomada s. str. (Robertson.)

Like *Gnathias* but with simple mandibles.

(6.) *N. flammigera* Ckll. N. Yakima (*Jenne*); see Ann. and Mag. Nat. Hist., July, 1906, p. 71.

(7.) *N. cressoni trevoriana* Ckll. Olympia (*Kincaid*).

(8.) *N. kincaidiana* Ckll.

(9.) *N. itamera* n. sp. Pullman (*Mann*).

(10.) *N. orcusella* n. sp. Orcus I. (*Mann*).

(11.) *N. malonella* n. sp. Wawawai (*Mann*).

(12.) *N. malonina* n. sp. Wawawai (*Mann*).

(13.) *N. packardiella* Ckll., var. a. Mesothorax with three black stripes; a large yellow patch on fifth abdominal segment. Pullman, May 14, 1909 (*Mann*).

(14.) *N. pulsatillæ* Ckll., var. a. Silvery apical lunule on abdomen larger. Pullman, May 2, Spokane, May 30, and Wawawai, May 1 (*Mann*).

(15.) *N. vicinalis aldrichi* Ckll. Spokane, May 30 (*Mann*).

Xanthidium.

(16.) *N. citrina* Cresson.

(17.) *N. rivalis* Cresson.

(18.) *N. civilis* Cresson. Males with scutellum all dark. Wawawai, April 24 to May 15, and Pullman, May 20 (*Mann*).

(19.) *N. civilis spokanensis* n. subsp. Spokane (*Mann*).

(20.) *N. modocorum* Ckll. Spokane, May 30 (*Mann*).

(21.) *N. coquilletti* Ckll. Wawawai, March and April (*Mann*).

The characters originally given to separate *N. coquilletti* from *N. modocorum* are not constant; the Washington State specimens separate as follows:

(a.) Abdomen red, yellow and black; tegulæ red; scutellum with two red spots; metathorax without spots; legs red and black.
  (a.) Larger (and with other differences) *N. vicinalis aldrichi*
  (b.) Smaller................................*N. modocorum*

(b.) Abdomen black and yellow, with a little reddish; legs yellow, red and black; tegulæ yellow, at least in part; scutellum, postscutellum and metathorax black...........*N. coquilletti* ♂

(22.) *N. pascoensis* Ckll. Pasco (*Kincaid*); Wawawai, May 15 (*Mann*).

(23.) *N. jennei* Ckll. N. Yakima (*Jenne*). Not a true *Xanthidium;* there is apparent affinity with *Micronomada;* see Canad. Entom., 1906, p. 282.

Holonomada.

(24.) *N. hesperia* Ckll. Pullman, May 15 and 23, 1909 (*Mann*). One is much smaller than the other.

(25.) *N. edwardsii* Cresson. Pullman, June 1 (*Mann*).

(26.) *N. vinnula* Cresson. Spokane, May 20, Wawawai, May 15, and Pullman, May 23 (*Mann*).

(27.) *N. mutans* n. sp. Pullman (*Mann*).

Micronomada.

(28.) *N. semisuavis* n. sp. Wawawai (*Mann*).

Nomadula.

(29.) *N. articulata* Smith. Pullman, May 28 (*Mann*).

(30.) *N. erythrochroa* Ckll. Pasco (*Kincaid*); N. Yakima, June (*Jenne*).

SOME NEUROPTERA FROM AUSTRALIA.

By Nathan Banks,

East Falls Church, Va.

From Professor Perkins of Hawaii, and Mr. Dodd of Kuranda, Queensland, I have received a number of Australian Neuroptera. The Chrysopidæ and a few other forms are described in this article. There are four genera of Chrysopidæ in Australia; *Chrysopa, Nothochrysa, Ankylopteryx,* and *Apochrysa.* The first two occur in the United States, but *Nothochrysa* only in California. As with us *Chrysopa* is the largest genus, and some of the species are very similar to some of our forms.

Chrysopa.

The Australian forms known to me can be distinguished by the following table:

1. Dark marks on the vertex.............................**C. ramburi**
No marks on the vertex.............................2.
2. Veins all green.............................6.
Veins partly black.............................3.
3. A black spot on the radial sector, shortly before the stigma
C. signatipennis
No such spot.............................4.
4. Many veins more or less margined with dark.............................5.
Veins not margined.............................**C. innotata**
5. A band across the face.............................**C. irregularis**
No band across face.............................**C. regularis**
6. Basal part of antennæ blackish.............................7.
Antennæ all pale.............................8.
7. Vertex mostly red, face reddish.............................**C. atalotis**
Vertex yellowish, a transverse red stripe over base of antennæ from eye to eye.............................**C. satilota**
8. Divisory veinlet commonly ending before the cross vein; wings long, slender, acute.............................**C. otalatis**
Divisory veinlet ending beyond the cross vein.............................9.
9. Larger species; stigma indistinct, vertex reddish; wings very narrow
C. italotis
Medium species, stigma not very distinct; vertex pale; wings quite broad.............................**C. latotalis**
Smaller species, a reddish spot on vertex, stigma of hind wings very prominent.............................**C. olatatis**

Chrysopa signatipennis sp. nov.

Pale yellowish; antennæ slender, pale, basal joint large and long, compared with the size of the head; pronotum longer than broad, narrowed in front, and each side with a dark spot; abdomen dark toward tip. Wings with mostly pale venation, the gradate series slightly darker; there is in each fore wing a very prominent black spot on the radial sector between the sixth and seventh cross-vein from sector to radius; the stigma is scarcely distinct. Wings rather slender, slightly acute at tip, the costal area much broader than the third cubital cell, latter twice as long as broad, the divisory veinlet ends just beyond the cross-vein; about seven veinlets in outer gradate series, six in the inner, the outer series quite remote from the margin. There are four cross-veins between radius and subcosta beneath stigma; hind wings not very much narrower than the fore pair. Expanse 25 mm.

From North Queensland (Perkins).

Chrysopa regularis sp. nov.

Pale yellowish; basal joint of antennæ with two reddish-brown lines on the outer side; pronotum very short, and narrower than the vertex. Wings with longitudinal veins mostly yellowish, transverse veinlets mostly black, and partly bordered with faint brown; the branches of the radial sector are also brown, and margined; stigma short, dark; in hind wings the venation mostly pale, but costals dark. Wings rather short, blunt; costal area plainly broader than third cubital cell, divisory veinlet ending far beyond the cross-vein, four veinlets in each gradate series, only four branches of radial sector, only twelve costals before stigma, between subcosta and radius, below the stigma, are four cross-veins; hind wings narrow, more acute, only four branches to radial sector, latter at base united to median for much more than a cell length. Expanse 18 to 20 mm.

From Middle Queensland (Perkins).

Chrysopa irregularis sp. nov.

Pale yellowish, a transverse red band across face below antennæ from eye to eye, a red spot on each cheek, and a red stripe above on basal joint of the antennæ; pronotum short and broad, broader than the vertex. Wings with mostly pale venation, very faintly bordered with brown, darker on some dark veins near base of costa, near stigma, at tip of wings, near end of anal vein, and at middle of hind margin, stigma dark; hind wings with pale venation, except at end of anal vein. Fore wings moderately long, almost acute at tip, costal area much broader than the long third cubital cell, the divisory veinlet ends just beyond the cross-vein, about three gradate veins in inner series, and four or five in outer; near tip of wing is a diamond-shaped cell formed by the last fork of radius bending up near to radius, and connected thereto by a very short cross-vein; five branches of radial sector, about sixteen costals before stigma. Hind wings narrow, and much shorter than fore wings, the radial sector at base connected to median by less than a cell length. Expanse 24 mm.

From North Queensland (Perkins).

Chrysopa olatatis sp. nov.

Pale greenish; antennæ yellowish, a reddish spot behind on the vertex; pronotum green, with a broad pale median stripe, thorax and abdomen also greenish, with median dorsal pale reddish stripe. The abdomen rather short, pronotum much broader than long; wings unmarked, but the stigma of the hind pair very prominent and reddish brown. Wings short, but acute at tip, costal area barely broader than the third cubital cell, latter hardly twice as long as broad, divisory veinlet ending beyond the cross-vein; five veinlets in each gradate series, and four between subcosta and radius beneath the stigma. The hind wings not much narrower than the front pair; venation all pale green. Expanse 21 mm.

From Port Darwin, 4 Sept. (Dodd).

Chrysopa italotis sp. nov.

Pale yellowish, vertex slightly reddish; antennæ wholly pale yellowish; pronotum nearly twice as broad as long, green, with pale median stripe; thorax and abdomen pale. Wings unmarked, stigma indistinct. The wings long and narrow, acute at tip, the costal area barely broader than the third cubital cell, the latter long, with base uneven, divisory veinlet ending beyond cross-vein; eight gradate veinlets in the outer series, five or six in the inner series; about six cross-veins between radius and subcosta beneath stigma; in the hind wings the radial sector unites with the median for about a cell-length; venation all pale yellowish. Expanse 34 mm.

From Port Darwin, 19 March (Dodd).

Chrysopa latotalis sp. nov.

Pale yellowish throughout, unmarked, unless cheeks are rather rufous, and a faint paler stripe on middle of pronotum. Pronotum much broader than long, with transverse groove behind the middle; apex of male abdomen from side obliquely truncate, longer above. Wings of moderate size, broad and blunt at tips; costal area a little broader than the third cubital cell, base of latter not oblique, divisory veinlet ending beyond the cross-vein; about seven gradate veinlets in outer series, and five in inner series; below stigma three or four cross-veins between radius and subcosta; the stigma in both pairs of wings rather prominent; in hind wings the radial sector is united to the median for much less than a cell-length. Expanse 28 mm.

From Kuranda (Dodd), and North and Middle Queensland (Perkins).

Chrysopa atalotis sp. nov.

Vertex, face and most of basal joints of the antennæ reddish, basal part of antennæ black; pronotum longer than broad, narrowed in front, green, with a pale median stripe; thorax yellowish; abdomen brownish green; legs pale. Wings hyaline; venation greenish, costa, subcosta and the radius more yellowish, stigma moderately prominent, yellowish. Wings rather large, hardly acute at tip; costal area no wider than the third cubital cell, base of this cell very oblique, the divisory veinlet ending beyond the cross-vein, about eight or ten veinlets in the outer gradate series, and four in the inner series; beneath the stigma there are about six cross-veins between radius and subcosta; in the hind wings the radial sector is united to median for the length of a cell. Expanse 32 to 35 mm.

From Port Darwin, January, April (Dodd).

Chrysopa satilota sp. nov.

Head pale yellowish, a deep red stripe from eye to eye, just above the antennæ; basal joint of antennæ large, yellowish, beyond the antennæ are brownish, but paler toward tips; pronotum longer than broad, narrowed in front, greenish, with pale median stripe; thorax and abdomen yellowish; legs very pale, darker on tarsi; tip of male abdomen, seen from the side, deeply incised in middle. Wings hyaline, rather large, acute at tips; costal area hardly broader than the third cubital cell, base of this cell scarcely oblique, divisory veinlet ending beyond the cross-vein; about eight veinlets in the outer gradate series, and five in the inner; below the stigma four or five cross-veins between subcosta and radius; all venation very pale greenish, unmarked. Expanse 31 mm.

From Port Darwin, 1 May (Dodd).

Chrysopa otalatis sp. nov.

Pale yellowish or greenish throughout, no markings, but the cheeks are more or less rufous, and there is sometimes on the thorax a trace of a paler median stripe; the venation is all pale yellowish, unmarked. The pronotum is as broad as long, but little narrowed in front, usually with a transverse ridge near the middle; the tip of male abdomen, seen from the side, is deeply incised, but the upper part projects farther than the lower. The wings are very slender, acute at tip, but the costal area is fully as broad as the third cubital cell, the latter is very long, the divisory veinlet ending before the cross-vein; about seven veinlets in each gradate series; below the stigma about four cross-veins between subcosta and radius; the stigma not especially prominent; in hind wings the radial sector unites to the median for more than a cell-length. Expanse 28 mm.

From Brisbane, and Bundaberg district, Queensland (Perkins).

Nothochrysa.

In all the Australian species the middle veinlet connecting anal to cubitus in the fore wings is much nearer to the outer than to the inner veinlet. The four species known to me are separable as follows:

1. A black spot between bases of antennæ, and two dark spots on vertex **N. tripunctata** M'Lach.
No spot between antennæ..2.
2. A dark band across face below antennæ, pronotum and thorax marked with black..................................**N. facialis** Bks.
No marks on face..3.
3. Marks each side on pronotum; divisory veinlet of third cubital cell dark..**N. insignis** Walk.
No marks on pronotum; divisory veinlet of third cubital cell pale **N. lata** Bks.

Nothochrysa facialis sp. nov.

Pale yellowish; a transverse black band across the face below the antennæ, rest of head unmarked; antennæ brown, except basal and second joints; pronotum with a rather broad, elongate, black spot on each side, two prominent black spots on middle lobe of mesonotum, a spot along anterior border of the lateral lobes, three small dots on lateral lobes of metathorax, and a narrow band across basal segment of abdomen, rest of abdomen with some black spots; a few dark spots on the mesosternum. Wings with pale veins, the cross-veins nearly all black, likewise most of the radial sector, also the divisory veinlet; stigma not very dark. Wings elongate, slender, acute at tip, costal area scarcely as broad as third cubital cell, the divisory veinlet slightly oblique; about eight veinlets in the outer gradate series and seven in the inner; in the hind wings the outer part of radial sector, outer cross-veins, and gradate veinlets are black. Expanse 30 mm.

From Port Darwin, 27 March (Dodd).

Nothochrysa lata sp. nov.

Pale yellowish throughout; pronotum extremely broad, about three times as broad as long; thorax very large. Wings elongate, but not acute at tip, venation mostly pale, the gradate series black, and many other veins, especially cross-veins, black at base and tip. Costal area not as broad as third cubital cell, the latter rather short, the divisory veinlet slightly oblique; eight gradate veinlets in the inner series, nine in the outer series; in hind wings the venation is almost wholly pale. Expanse 40 mm.

From Port Darwin, 29 August (Dodd).

Ankylopteryx pallida sp. nov.

Pale yellowish throughout, the palpi marked with dark at the tip, and on each anterior corner of pronotum is a dark spot; wings pale, some of the cross-veins and gradate series faintly dark, but a more distinct spot on the radius at the point where it is joined by the first cross-vein from the radial sector; costal area at origin of radial sector is nearly as broad as rest of the wing at that point, the radial sector very sinuous, emitting six or seven branches; the third cubital cell nearly twice as long as broad, the divisory veinlet cutting off a small cell, but ending beyond the cross-vein; near tip of wing the subcosta diverges from the radius, between radial sector and median are four cross-veins; hind wings much narrower, acute venation pale. Pronotum slightly longer than broad, narrowed a little in front. Expanse 24 mm.

From North Queensland (Perkins). *A. immaculata,* described from Tasmania, has a spot over antennæ, distinct stigma, etc.

Myiodactylus pubescens sp. nov.

Pale yellowish; sides of pronotum faintly greenish, a black dot on each anterior lobe of the mesothorax; antennæ near middle barely darker; wings with only a few cross-veins in middle area black and black at forkings of some of the costals, and those along apical margin. Antennæ barely more than one third the length of the wings; pronotum slender, narrowed in front, a furrow before the middle, and a swollen ring at the posterior margin. Wings extremely broad, not two and a half times as long as broad, a few of costals forked near middle, all near tip, as likewise all around apical and outer margin; radial sector with nine branches, the connecting veinlets numerous, about one in every three or four black, the cells mostly broader than long; entire surface of fore wings and also the costa densely hairy, mostly erect, especially prominent near anterior base; hind wings much less hairy, one half narrower, the radial sector with eight branches, and nearly all veins unmarked. Expanse 40 to 44 mm.

From Port Darwin, 18 March, 14 April (Dodd).

Mantispa pullula sp. nov.

Pale yellowish; a median brown stripe on the face; antennæ dark; pronotum slender, on enlarged part in front with brown sides and two submedian brown stripes; thorax pale, dark on lateral lobes; femur of leg I dark brown on inner side, middle and hind coxæ obliquely barred with brown. Wings hyaline, with red-brown stigma. In general similar to *M. imbecilla,* but much smaller, only 7 to 9 millimeters to tip of wings, and the stigma of wings is still shorter than in that species, and more swollen on the costal side.

From Port Darwin, 10 Sept. (Dodd), apparently common.

WET WEATHER COLLECTING.

Until June 23, 1906, collecting lepidoptera had been associated in my mind with fairly pleasant days or nights, but on that date I started out on a misty forenoon with a beating net intending to look only for coleoptera. Promising logs and fungi led me into a thick growth of large hemlocks, pines, and firs, with scattered hard woods of several species, where several moths brought to mind the request of a friend for Geometridæ. After four hours work, the last of which was in a pouring rain, I retreated with eighty-five specimens representing the genera *Heterophleps, Tephroclystis* (*Eupithecia*), *Mesoleuca, Hydriomena, Euchœca, Sciagraphia, Macaria, Homochlodes, Melanolophia, Æthaloptera, Anagoga, Gonodontis, Caberodes, Sabulodes,* and *Xanthotype* of the Geometridæ; *Pyrophila, Homoptera,* and some of the so-called Deltoids, besides some genera of the families of the Platypterygidæ, Pyralididæ, Tortricidæ, and Œcophoridæ.

Many of the specimens were taken on the sheltered side of the tree trunks, on the under side of lodged dead ones, and on the sides of old logs. They were flushed from the tops of live evergreens, from thickets of dead tops and brush, by throwing clubs and stones into them, from whence they would flutter away to the ground or to some nearby tree, where they were sometimes easily bottled. Again, some exciting net and foot work would be necessary, and I found that a heavy beating net — soaking wet, too,— is not the best thing for flying moths. I also discovered that thumps and kicks against the smaller trees would often bring down, besides the water, a number of species not otherwise seen. About 2.30 p. m., my clothing became so thoroughly soaked and the net had to be wrung out so often that it became too disagreeable even for an entomologist. I have never seen the Geometridæ so plentiful as they were during that season at Monmouth, and Wales, Maine, which may, in a measure, account for my success on such a day.

C. A. Frost.

A NEW SPECIES OF TELENOMUS PARASITIC ON THE EGGS OF TUSSOCK MOTHS.

By Charles T. Brues.[1]

The present species belonging to the very extensive Scelionid genus *Telenomus* was reared from eggs of two species of Tussock moths and sent to me by Mr. W. F. Fiske, in charge of the Gypsy Moth parasitological laboratory of the U. S. Bureau of Entomology at Melrose Highlands, Mass. It appears to be new to science and as Mr. Fiske wishes to refer to it in a forthcoming publication, he has requested me to prepare the description which is herewith presented.

Telenomus fiskei sp. nov.

♀Length 1 mm. Shining black; the legs, except coxæ, honey yellow or brownish-yellow, the femora piceous or fuscous; wings hyaline. Head nearly four times as wide as thick antero-posteriorly. Ocelli in a curved line, the lateral ones removed from the eye margin by less than their own diameter. Head margined behind the eyes, the raised margin extending over the vertex as a distinct carina for about a third the distance toward the median line; behind this the occiput is margined, more distinctly so on the sides. Vertex shagreened; the front below the ocelli smooth, and highly polished, but with a shagreened sculpture on the sides below. Antennæ black; 10-jointed, with a 5-jointed club. Scape brownish at base and apex, reaching nearly to the vertex; pedicel brownish at the tip, fully twice as long as thick at the apex; first flagellar joint fully as long as the pedicel and as thick; second shorter, two thirds as long, the fourth broader and more rounded; first four club-joints large, quadrate, equal; last a trifle longer, and sharply conically pointed. Thorax as wide as long, very convex in front, shining above, but thinly covered with a white pubescence. No trace of parapsidal furrows. Mesonotum and scutellum very faintly shagreened. Postscutellum finely rugulose-punctate. Abdomen short, sessile, about as long as the thorax, first segment coarsely longitudinally striated, four times as broad as long at the middle; longer at the sides, and with a large fovea at each anterior angle; second segment with a basal series of longitudinal striæ as long as those on the first segment medially, but becoming shorter toward the sides; about one third longer than wide; following segments each very short, together scarcely over one third the length of the second. Wings hyaline, the venation pale yellowish brown, marginal vein rather short, one half the length of the stigmal.

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[1] Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 21.

Male. Differs from the female by its paler antennæ, which have the scape and pedicel pale brownish yellow and the flagellum fuscous; pedicel subtriangular, two thirds the length of the first flagellar joint, which is equal to the second; third and fourth growing shorter; fifth to ninth moniliform, broader; last twice as long as the penultimate, gradually pointed.

Described from ten specimens from Machias, Maine, August 20, 1909, Cambridge, Mass., August 3, 1907, and Brooklyn, N. Y., June, 1900. The Maine specimens were reared by Mr. C. W. Johnson from the egg-mass of *Notolophus* on spruce; those from Cambridge, Mass., from egg-masses of *Hemerocampa leucostigma;* and those from Brooklyn were reared by Mr. Theo. Pergande from *Hemerocampa leucostigma.*

This is a most remarkable species in having the antennæ of the female ten instead of eleven jointed, but it is so typically a *Telenomus* in all other respects, that I have refrained from separating it. So far no other members of this tribe have been described as having only ten antennal joints.

THE CHALCIDOID PARASITES OF THE COMMON HOUSE OR TYPHOID FLY (*MUSCA DOMESTICA* LINN.) AND ITS ALLIES.[1]

II. RECONSTRUCTION OF THE GENUS *Pachycrepoideus* ASHMEAD OF THE FAMILY PTEROMALIDAE, WITH DESCRIPTION OF *P. Dubius* ASHMEAD, SP. NOV., ITS TYPE SPECIES.

BY A. A. GIRAULT AND GEORGE ETHELBERT SANDERS,

The University of Illinois.

Introduction.

This second of the series of papers on the chalcidoid parasites of the house fly and its allies considers a monotypical genus which occurred but rarely in connection with its host. We met with it but four or five times during the course of our rearing work and are not perfectly sure as to its rôle as a parasite. The tribe to which it belongs is composed of genera supposed to be mostly hyperparasitic, but at the present state of our knowledge of the host relations of the group, this is no reason for classing the genus as the same. Our records lead us to believe that it attacks *Musca domestica* as a primary parasite, with the possible alternative of being secondary, its host *Muscidifurax raptor* Girault and Sanders MS.[2] or one of the species of *Spalangia,* also to be considered later.

History and Description of the Genus.

In a table of the genera of the Sphegigasterine tribe Pachyneurini published in 1904, Ashmead, in his memoir on the classification of the chalcid flies, briefly described the genus under consideration, merely naming the species *Pachycrepoideus dubius* Ashmead as type, without describing the species or even indicating that it was new to science. The genus was proposed as follows:

"*Table of Genera.*

1. Females 2
   Males 7
2. Mesothoracic furrows distinct, complete..........................3
   Mesothoracic furrows incomplete, indicated only anteriorly..........4

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[1] Continued from Vol. XVII, p. 28.

[2] Described in the third paper of this series.

3. Stigmal vein with a large knob; abdomen ovate, pointed at apex, the second segment large, the third segment very short, the fourth and fifth rather large, sub-equal, the following very short.
Pachycrepis Förster (type *Caruna clavata* Walk.)
Stigmal vein with a small knob; abdomen ovate, the second and third segments large, the fourth and fifth very short, the sixth and seventh longer.
Pachycrepoideus Ashmead, g. nov. (type *P. dubius* Ashm.)
4. Abdomen above flat or depressed..................................5
Abdomen above convexly rounded..................................6
5." Etc., p. 329.

Extracting, the genus was described thus, including both sexes: Pteromalids with the abdomen distinctly petiolate; fore wings with the marginal vein not especially long but thick and stout; cephalic aspect of head short and rounded, the occipital line incomplete; antennæ inserted on or near the middle of the face, far above the clypeus; mesothoracic furrows distinct, complete; stigmal vein with a small knob; abdomen ovate, the second and third segments large, the fourth and fifth very short, the sixth and seventh longer.

It is only through the kindness of Mr. J. C. Crawford of the United States National Museum, who compared our specimens with the single type specimen of the genus, that we were able to establish their identity. The existing codes of nomenclature do not clearly cover this case. As a matter of principle, we are greatly opposed to accepting genera belonging to this class, especially those of recent description, believing them to be obstructions; the species is a *nomen nudum,* for in this case it is obvious that the generic description does not include the species or have reference to any specific characters; it cannot be, therefore, in any sense an indication, definition, or description for the species. Hence, it is our opinion that all genera and species of this class are without status in nomenclature, the many opinions and the codes to the contrary notwithstanding. Accepting this fact, the genus *Pachycrepoideus* and its type species is subject to arbitrary treatment at the hands of the first systematist who happens to deal with it. We have nothing to do here with so-called credit or with courtesy, but solely with expediency and nomenclatorial science, which is impersonal. So we protest, not against this genus alone, but against all of the genera of its class, irrespective of authorship; as we protested against *Nasonia* Ashmead in the first paper of this series. At the present day, the formation of genera in this manner is both obstructive and inexcusable; it should be prevented.

Recognizing expediency alone in this case, we are of the opinion that both the generic and the specific name should be retained on the basis of reconstruction and that in order to avoid confusion, the original author of the names should be cited. We therefore retain the name *Pachycrepoideus dubius* Ashmead with the single female specimen, upon which the genus was founded as type.

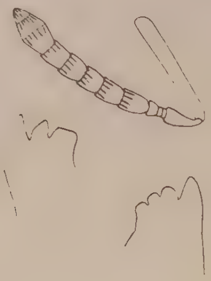

Fig. 1. Antenna of *Pachycrepoideus dubius* Ashm., and right and left mandibles showing dentition.

GENUS PACHYCREPOIDEUS ASHMEAD.

Type: *P. dubius* Ashmead sp. nov.

Female. Normal in size and aspect for the tribe; submetallic, reticulated. Head (cephalic aspect) circularly triangular, slightly wider than long; clypeus slightly wider than long, its apical margin slightly emarginate at the meson, the whole margin trisinuate; dorsal aspect, head wider than the thorax, the vertex broad and rounded, the occipital margin broadly concave but the vertex not noticeably narrowed at the meson, the ocelli in a flat triangle in the center of the vertex, distant from the margin of the eyes; latral aspect, genæ rounded, as long as the rounded-ovate eyes, the genal sulcus absent. Antennæ inserted about two thirds down the face, slightly ventrad of an imaginary line drawn between the ventral ends of the eyes, the flagellum clavate; antennæ 13-jointed, with three ring-joints (see fig.) and a 3-jointed club, the pedicel long, distinctly longer than the moderately long first funicle joint (Fig. 1).

Pronotum distinct, transverse, narrower than the mesothorax; parapsidal furrows distinct, complete; axillæ widely separated, extending mesad to the parapsidal furrows; scutellum normal, rounded; metathorax moderate in length, shorter than the scutellum, declivous, the pro- and mesonotum flat, the metanotum punctate, with complete lateral carinæ, without spiracular sulci and with no true median carina but with a distinct, subacute rotundity at its base medially; its spiracle moderately large, subreniform; no metathoracic neck. Abdomen with a moderate petiole, variable in shape, usually ovate and depressed, concave dorsad, flatly convex ventrad, with a slight ridge along the venter at the meson; rarely compressed and conic-ovate, flat dorsad, very convex ventrad but not long; second and third abdominal segments large, united forming about half the length of the abdomen (excluding petiole), the fourth and fifth segments subequal, much smaller; abdomen about equal in length to the thorax.

Wings normal, hyaline, the short and broad marginal vein subequal to the clavate stigmal vein and a fourth shorter than the narrow post-marginal vein; hind wings uniformly ciliate discally. Knob of stigmal vein small.

Tarsi 5-jointed, all tibial spurs single. Mandibles 3 and 4-dentate (Fig. 2). Maxillary palpi 4-jointed, the distal joint largest, labial palpi 3-jointed, the middle joint smallest, the others subequal.

Male. The same, but the antennæ are cylindrical and inserted nearer to the middle of the face, the genal sulcus present, the abdomen obconic and depressed and more or less truncate at the caudal end.

The genus cannot be confused with any other of the tribe Pachyneurini, excepting *Pachycrepis* Förster, the complete, distinct mesothoracic furrows distinguishing it. From *Pachycrepis* it differs in the smaller stigmal knob and the abdominal characters brought out in the quoted portion of Ashmead's table given previously.

No locality for the type species has been recorded in the literature, but the single type specimen now in the United States National Museum formerly bore the number 602 of C. F. Baker, Agricultural College, Michigan. We have found it only at Champaign, Illinois.

Our knowledge concerning the host relations of the genus is too scanty for positive statement. As shown on a later page, the single species was reared always in connection with *Musca domestica,* and in four of the six rearing records it was definitely connected with that host of which it appears to be a primary parasite. *Muscidifurax* Girault and Sanders MS. and *Spalangia* Latreille are common primary parasites of the house fly, and in one instance each was reared in numbers in connection with this species from the same host lot. In several of the host puparia in other lots from which *P. dubius* emerged (single specimens) there was found in each the blackened, compact meconium of the parasite, somewhat similar to that of *Spalangia* and *Muscidifurax,* as well as the remains of a pupa of *Musca,* which fact indicates primary parasitism. The evidence available, therefore, points to *Musca domestica* as the host of this species, which we consider as a solitary, external parasite with habits similar to those of *Muscidifurax* and *Spalangia.*

Pachycrepoideus dubius Ashm. sp. nov.

Ashmead, Mem. Carnegie Mus., I, pp. 329, 383 (1904).

Female. Length variable, 1.45–2.10 mm. Normal for the tribe. General color nigroæneous, black with slight æneous reflections, submetallic but in bright sunlight metallic dark-greenish, the abdomen smooth and shining, polished black, like surface of tar, the head and thorax closely reticulated or confluently punctate, reflective, somewhat glossy and sparsely hispid; antennæ concolorous but not metallic, the scape, pedicel and first two ring-joints variable, usually fuscous, the pedicel dusky dorsad; coxæ concolorous, the cephalic and intermediate coxæ more diluted in color, the posterior coxæ metallic; legs variable, uniformly fuscous, with the apical tarsal joint dusky or black, or else fuscous with more or less blackish in the dorsal aspect of the femur or the whole femur distinctly darker than the following joints; tegulæ fuscous; wings hyaline, venation neutral black, the marginal vein conspicuous. Eyes inconspicuous in color, dark garnet, the middle longitudinal third much darker, forming a dark median longitudinal stripe; ocelli liquid pinkish. Venter concolorous. Clothing of body inconspicuous.

(Cephalic aspect) head sub-circular, circularly triangular, slightly wider than long, face with a median impression along the scrobes, the scapes lying side by side in the impression and extending not quite to the cephalic margin of the vertex or to the dorsal apex of the eyes and less near to the cephalic ocellus; clypeus slightly wider than long, slightly emarginate at the meson of its apical (ventral) margin, its basal or proximal (dorsal) margin slightly convex, its sutures obsolete, but the whole sclerite slightly impressed and finely, longitudinally striate; antennæ inserted nearly two thirds down (ventrad) the face, slightly below (ventrad) an imaginary line drawn between the ventral ends of the eyes, but not especially near the clypeus, being slightly more the distance above (dorsad) that sclerite as the latter is long at the median line; (lateral aspect) genal sulcus absent; the cheeks rounded and as long as the length of the eyes; the latter rounded-ovate, longer than wide, with sparse, minute setæ, practically naked, their surface about equal in roughness to the general sculpture of the head; face declivous ventrad from the insertion of the antennæ; (dorsal aspect) head twice wider than long, wider than the greatest width of the thorax, the vertex broad, its cephalic margin straight and rounded, the occipital margin rounded, concavely curved, the visible portions of the margins of the eyes regularly convex, entire; portions of the head caudad of the eyes narrow but not acute or sharp; lateral ocelli narrow or linear-ovate, the cephalic ocellus circular; each lateral ocellus slightly farther from the respective eye margin than from the cephalic ocellus and a third farther apart from each other than each is from the cephalic ocellus. Occipital foraminal impression rounded.

(Dorsal aspect) pronotum visible, distinct, not as wide as the mesonotum and about a fourth its length, not narrowed at the meson, its margins straight and rounded, obtuse; pro- and mesonotum practically flat, slightly convex (lateral aspect, viewed in outline), the thorax declivous at the mesopostscutellum; parapsidal furrows distinct, complete, narrow, convexly curved; cephalic margin of the mesoscutum straight, its caudal margin broadly convex; axillæ, with their mesal apices or angles, reaching to the base of the respective parapsidal furrow, the suture separating them from the scutellum widening caudad and with a few transverse ridges; scutellum broadly rounded caudad, nearly as long as the mesoscutum, with a faint cross-furrow before apex; mesopostscutellum narrow; metathorax moderate in length, not quite as long as the scutellum, declivous, punctate, bicarinate, without a spiracular sulcus, the spiracle moderately large, subreniform (linear and slightly curved), lying in an oblique position and with its cophalo-mesal end near the lateral carina and not distant from the mesopostscutellum; disk of the metathorax, or portion included between the lateral carinæ, produced farther caudad than the lateral portions of the segment, its lateral angles subacute; neck absent; folds or lateral carinæ distinct, complete, running caudo-mesad in a gently curving line; median carina absent, but at the base of the metathorax at the meson and against the mesopostscutellum is a distinct, subacute rotundity, best seen from the direct lateral aspect. Thorax moderately, confluently punctate, or coarsely reticulated, the sculpture slightly coarser than that of the head, and still more coarse on the disk of the metanotum. Thoracic pleura similarly sculptured, as are also the posterior coxæ; anterior coxæ reticulated, the intermediate coxæ nearly smooth.

Abdomen distinctly petiolate, the petiole moderate in length; the tip of the ovipositor slightly exserted; ventral valves inconspicuous; segments two and three subequal, long, the second longer, both taken together occupying half the surface, the fourth and fifth segments subequal, short, each about a half the length of either the second or third segments; caudal margins of the second and third segments in the dorsal aspect straight, in the lateral aspect curved convexly and in the ventral aspect bilobed, incised at the meson; remaining abdominal segments inconspicuous, the apical segment acute. Wings normal for the tribe, that portion of the fore wing distad of the submarginal vein closely ciliate, the remaining proximal part mostly naked, the marginal cilia of fore wing short and close, absent proximad on both margins; marginal vein abnormally broadened as in *Pachyneuron* Walker, conspicuous, about thrice the width of the postmarginal vein, short and broad, about the length of the stigmal vein and about a fourth shorter than the slender postmarginal vein; submarginal vein narrow, widening at distal sixth at its curve before joining the marginal vein and more than four times longer than the latter, much slenderer and bearing about fifteen large bristles from its surface; stigmal vein shorter than the postmarginal vein, straight, clavate, and with a small uncus, its knob or club distinct but not formed abruptly; postmarginal vein long and slender, uniform in width, distinctly longer than either the marginal or stigmal veins, being about a fourth longer than either; marginal cilia of the costal margin of the wing beginning at the proximal end of the marginal vein; fore wing broadly rounded at the apex, the wing being widest at a point slightly distad of the end of the postmarginal vein; several spurious veins present. Hind wings uniformly, but not densely, ciliate on the disk, the submarginal vein extending to the hooklets; the costal cell irregular in shape, dilated in the middle, the submarginal vein consisting of a moderately broad proximal half, confluent, or nearly, with the costal margin, then an abrupt narrow portion not as long as the proximal thickened half and curving caudad away from the costal margin, the costal cell distinct and moderately broad at that point, and finally a third, short curved part distad, as broad as the proximal half and curved latero-cephalad to join the marginal vein at the hooklets and uniform in width with the marginal vein; submarginal vein about one and a half times longer than the marginal vein; posterior wings broadest at a point just distad of the apical end of the marginal vein, that is to say, a short distance distad of the proximal half of the wing; apex subacute; marginal cilia longer, sparser, longest on the caudal margin of the distal half or third of the wing. Tarsi 5-jointed, the tibial spurs all single.

Antennæ consisting of a scape, pedicel, three ring-joints, five funicle joints and three club joints; funicle and club hispid-pubescent, the flagellum regularly clavate, the club not abruptly formed or much larger or wider than the funicle. Scape long, cylindrical, slightly tapering distad, more than half the length of the flagellum and longer than the funicle, subequal in length to the united length of the pedicel, three ring-joints and the first three funicle joints; pedicel obconic, conspicuously longer than the third ring-joint and equal in length to it and the first funicle joint combined; the two proximal ring-joints distinct, equal, combined slightly longer than the third ring-joint, the latter abruptly smaller than the first funicle joint, a large ring-joint, nearly twice the size of either of the other ring-joints, and not bare like them, but only a third the length of the following joint and about a fourth the length of the pedicel, wider than long; funicle joints cylindrical, but gradually becoming shorter, so that the fourth and fifth are subquadrate and subequal, the second and third subequal, longer than wide and the first the longest joint of the funicle, about a third longer than the fourth or fifth; the basal joint of the club subquadrate but slightly longer and wider than the fourth or fifth funicle joints; the intermediate joint wider than long, and the apical joint obtusely conical, slightly larger than the third ring-joint; but a single row of hispid hairs on each joint of the funicle and club, in balsam mounts of antennæ appearing as white longitudinal ridges (Fig. 1).

Mandibles 3- (left) and 4-dentate (right), in the former case, the inner mesal tooth is truncate and shortest, the two others acute, the lateral tooth longest; in the latter case, the three inner (mesal) teeth small, obtuse and subequal, the lateral outer tooth much longer, obtusely conic (Fig. 2).

From fourteen specimens.

Male. Length, variable, averaging 1.60 mm. The same, more æneous metallic, the sculpture coarser, the body more slender, the antennæ pilose-pubescent, inserted nearer to the middle of the face, distinctly above (dorsad) of an imaginary line drawn between the ventral ends of the eyes, but not half way up the eye margins, the face more convex; antennal scrobes deep, margined, running vertically nearly to the cephalic ocellus and nearly confluent at the meson, the medial impression not as noticeable as in the female; genal sulcus present, but very faint, narrow; the abdomen more distinctly petiolate and depressed, obconic, broadly truncate caudad, the second segment longest, covering two thirds of the surface, the abdomen widest at its apex, the third segment about a half shorter and the remaining ones hidden within; genitalia exserted in death; abdomen, including the petiole, not quite as long as the thorax, slightly concave dorsad, slightly convex ventrad; petiole not coarsely rugose.

Antennæ the same in general, but more slender, the flagellum cylindrical; club somewhat narrower than the funicle, the scape slightly curved, not tapering distad, cylindrical, not as long in proportion to the flagellum, less than half its length and not quite as long as the funicle; pedicel large but not as long as the united lengths of the third ring-joint and first funicle joint; the proximal ring-joint smaller than the intermediate one; all funicle joints longer than wide and subequal; the third ring-joint is subquadrate, yet longer than wide and about half the length of any one of the funicle joints and longer than the united lengths of the two proximal ring-joints; first funicle joint not noticeably longer than the fifth; club cylindrical, its first two joints subequal, longer than wide, somewhat shorter than funicle five, the apical joint conical, a fourth shorter than the basal joints. At least three rows of pilose hairs on funicle joints one to five and the three club joints and two rows on the third ring-joint; a few short hairs on the dorsal aspect of the pedicel, the two proximal ring-joints and scape naked.

Mandibles as in the female; the distal joint of the maxillary palpi twice longer than any of the three remaining joints, which are all subequal and moderately short; the distal joint of the maxillary palpi clavate and hairy at its tips.

Described from eight males and fourteen females, unless otherwise stated, now in the collections of the Illinois State Laboratory of Natural History, Urbana, Illinois, and reared in the insectary of the office of the State Entomologist of Illinois, at Urbana during the late summer of 1908, from the following experiments: (1) One female appeared Sept. 11, 1908, in company with two females of *Nasonia brevicornis* Ashmead from decomposed chicken entrails infested with dipterous maggots, taken from the city dumping grounds, Champaign, August 22, 1908; from these viscera were obtained *Chrysomyia macellaria* (Fabricius), Sept. 7, *Calliphora erythrocephala* (Meigen), Sept. 11, and *Sarcophaga* sp. "K,"[1] Sept. 22. (Accession No. 41003, 1 ♀ tagmounted; ♀ head in xylol-balsam); (2) One female appeared Sept. 3 from a cage containing maggots in decomposed watermelons from the same place, and from which were reared a *Drosophila,* August 30 to Sept. 17, and *Musca domestica,* September 1. (Accession No. 39808, 1 ♀ tagmounted.) (3) On Sept. 10, a number of Pteromalids were collected from the cages in which muscid and other dipterous larvæ were breeding and confined separately in capsules each with a single puparium of *Musca domestica.* One of these Pteromalids proved to be a female of *P. dubius* [2] which was observed to oviposit into the host puparium on Sept. 10. The resulting progeny proved to be a single female which was found on the fifth of the following October. (Accession No. 40177, 1♀ tagmounted, ♀head in xylol-balsam). (4) Five males and nine females appeared October 24 or previously from a cage containing a quantity of puparia of *Musca domestica* reared from the maggots collected in horse manure, Sept. 20, in a manure box in Urbana, and then left until Sept. 30 exposed in the insectary where they were evidently parasitized. On the latter date, each puparium was isolated in a capsule, and from these capsules were taken the nine females and five males; other pteromalids, *Muscidifurax* and *Spalangia,* were very abundant. (Accession No. 40253, 4♂'s, 9♀'s tagmounted; ♂ head in xylol-balsam. Remaining ♂, homotype in U. S. N. M.) (5) One male appeared on October 2 in company with a number of *Muscidifurax* from a large lot of puparia of *Musca domestica* reared from maggots in horse manure and exposed to parasites for three days, Sept. 8–11. On Sept. 17, the host puparia were isolated in gelatine capsules and from one of these puparia the male emerged. The puparium contained the host pupa in fragments and the single, large meconium of the parasite. (Accession No. 40171, 1♂ tagmounted). (6) Nine days later, October 11, from each of these isolated puparia of the same lot (*Musca domestica*) there emerged two males and one female. Both *Spalangia* and *Muscidifurax* were very common in this experiment. (Accession No. 40206, 2♂'s, 1♀ on tags).

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[1] New species; designated thus for convenience.

[2] Homotype in U. S. National Museum collection.

The characteristics of this species are the blackish æneous color, the generally uniformly fuscous legs, the concolorous coxæ, the generally fuscous scape, pedicel, and basal ring-joints, the remainder of the antennæ being neutral in color or nearly concolorous with the body, the polished abdomen and uniform sculpture of the thorax, the position and shape of the ocelli and the hyaline wings.

Among the thousands of Chalcidoid, mostly pteromalid, parasites reared from muscid and other Dipterous larvæ during the course of breeding experiments with the house fly during the latter part of the season of 1908 this species occurred very rarely as recorded in the foregoing.

Type: — Type No. 12260, United States National Museum, Washington, D. C., 1 ♀, tagmounted (C. F. Baker). *Homotypes:*— 1♂, 1♀ in the same collection, Urbana, Illinois, both tagmounted.

Nothing is known concerning the biology of this genus. The adults emerge (three cases) from the host puparium through a single circular hole with jagged edges but so far we know of no characteristic distinguishing these emergence holes from those of *Spalengia* or *Muscidifurax*. The meconium is a single dark compact mass circular in outline, but is not very characteristic and beggars description.

PROCEEDINGS OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

The 291st regular meeting of the club was held on Tuesday evening, December 21, 1909, with President Bolster in the chair, and with sixteen members and one visitor present.

Mr. Emerton, reporting for the Committee on the Smoker, said that preparations for two hundred visitors had been made, the smoker to be held at the Grundmann Studios, 198 Clarendon Street, Tuesday evening, December 28, from 8 p. m. Mr. Field reported the list of contributors to the exhibition and the preparation for the dedication of the Harris tablet at Milton on Friday, December 31, at 12.50 p. m. President Bolster reported the result of the meeting of the Executive and Publication Committee: the resignation of Mr. Field as editor of Psyche, and the hope that Mr. Brues would be able to undertake the work. Mr. Brues, being called upon by the chair, replied that he would try to manage things so that he could take up the work. The president appointed the following nominating committee to prepare a list of officers for the club for the ensuing year: Messrs. Blackburn, Reiff and Newcomb. Mr. Fiske was appointed delegate to represent the club at the eighth International Zoölogical Congress at Graz, Austria, in August of 1910. Dr. A. L. Reagh was elected member of the club.

Mr. Johnson exhibited a box of unique larvæ from several sources; a nymph, possibly of a may fly, from Ammonoosuc River, Fabyans, N. H., taken by C. H. Frost September 19, 1909; larvæ of *Galerita janus,* and what was pronounced by Professor Wheeler as being probably a female *Phengodes* from Providence, R. I.

He also exhibited two boxes of Diptera of the family Dolichopodidæ which has recently claimed his attention. He mentioned some new records for New England and said he had recognized 127 species from these states.

Mr. Forbes spoke of his studies of the larval stages of the Lepidoptera and requested specimens from the members.

C. A. Frost, *Secretary.*

The 292nd regular and the 33rd annual meeting since incorporation was held at the rooms of the Appalachian Mountain Club on Tuesday evening, January 18, 1910. There were ten members present: President Bolster and Messrs. Blackburn, Brues, Emerton, Frost, Newcomb, Reiff, Sheriff, Swett, and Timberlake.

After the reports of the Secreatry and Treasurer had been read the following officers were elected for the ensuing year:

President—Prof. W. M. Wheeler.
Vice President—W. F. Fiske.

Secretary—C. A. Frost.
Treasurer—F. A. Sheriff.
Executive Committee—J. H. Emerton, C. W. Johnson, P. G. Bolster.
Editor-in-Chief of Psyche—C. T. Brues.

The retiring President, Mr. P. G. Bolster, then gave the address: "Remarks on the History of the Cambridge Entomological club."

Materials for this paper were gathered from the records of the club and proved to be of great interest. Mr. J. H. Emerton, who attended many of the earlier meetings and who was one of the original organizers of the club added some recollections to Mr. Bolster's remarks. The progress of the club was reviewed from the first meeting at the home of Dr. Hagen at Cambridge down to the present date in so far as the records were available. Lists of the officers of the club, addresses of the retiring presidents, and much other data of historical interest were given. Mention was also made of the number of prominent entomologists throughout the country who have, at one time or another, been members of the club. Mr. Bolster closed his remarks by recommending that an index of the records be made for the valuable and interesting data that appear in them.

C. A. Frost, *Secretary.*

Meeting called to order by President W. M. Wheeler at 8 o'clock. Twenty members and two visitors present.

The Secretary being absent, Mr. H. S. Smith was appointed to act as Secretary *pro tem.*

Mr. Fiske gave a talk on "Hypermetamorphosis among Insects." The various types of hypermetamorphosis as defined and designated by Packard and as encountered in the work at the Gipsy Moth Parasite Laboratory were not at all analogous to each other Mr. Fiske stated. These phenomena fall distinctly into two groups, the one typified by that type of hypermetamorphosis occurring in certain beetles (Rhipiphoridæ, Meloëidæ) and the Hymenopterous genera *Perilampus* and *Orasema,* the other typified by that form of development occurring in certain Proctotrypids (*Inostemma, Platygaster*) and most of the Ichneumonids (*Ophion, Theronia, Limneria, Ichneumon*). The former he designated as Incomplete Hypermetamorphosis and the latter type as Complete Hypermetamorphosis.

The president asked Mr. Fiske to take the chair while he read a review of "A Monographic Revision of the Twisted-Winged Insects of the Order Strepsiptera Kirby" by W. Dwight Pierce. This paper was discussed by Messrs. Brues, Johnson, Fiske and others.

Mr. Newcomb exhibited some interesting photographs of hybrids and variations in the butterfly genus *Basilarchia.* He also showed an interesting melanistic specimen of *Argynnis cybele* from northern Wisconsin. Mr.

Reiff remarked on the work of certain European investigators upon the phenomenon of melanism in the genus *Argynnis* as occurring in Europe.

Mr. Emerton gave his report of the committee on the smoker given at the time of the meeting of the American Association for the Advancement of Science.

Mr. Brues made some remarks on the new form given to PSYCHE and stated that the forthcoming number would be in the regular octavo size instead of the royal octavo as heretofore. He asked especially for short notes and papers for publication.

The following persons were proposed for membership in the club:

Mrs. R. L. Draper, Canton, Mass.
Dr. J. S. Kingsley, professor of zoölogy in Tufts College.

Dr. Wheeler stated that certain rooms at the Bussey Institution were being remodeled and repaired and it was hoped that future meetings of the club might be there. It was moved and seconded that the next meeting of the club be held in these rooms. Carried.

HARRY S. SMITH,
Secretary pro tem.

The 294th regular meeting of the club was held at the Bussey Institution, Forest Hills, Tuesday evening, March 15, with 17 members and three visitors president, and President Wheeler in the chair. The minutes of the January and also the February meetings were read and accepted.

It was voted that extracts from the minutes of the meetings be published regularly in PSYCHE.

Mrs. R. L. Draper of Canton, Mass., and Dr. J. S. Kingsley, professor of zoölogy in Tufts College, were elected to membership. Mr. C. E. Montgomery, 338 Boylston Street, Boston, was proposed for membership by C. W. Johnson and W. L. W. Field. The resignation of R. W. Harris of Melrose was accepted. Mr. J. H. Emerton's paper on "Some Cases of Dimorphism in Spiders" was then presented with blackboard sketches; drawings, made with his usual care and accuracy, and alcoholic specimens of the species under discussion were also handed around. The following cases were described: 1. The females of *Misumena vatia* and *Misumena aleataria* may be either white or yellow. 2. Males of *Mævia vittata* have one form with spotted legs and colors like the female and another with white legs and the rest of the body black. 3. *Agrœca pratensis* and *Agrœca repens* are probably one species with one kind of male and females with two different forms of the epigynum. Females found at the same time and place have both forms. 4. *Ceratinella lætabilis* has two forms of male palpus, one with a short tibia with a wide tooth and a smooth edge to the tarsus. The other with a narrower tibia and tooth half as wide and the edge of the tarsus with two ridges.

Mr. C. W. Johnson spoke on the so-called "Ground Pearls," *Margarodes formicarium* of the West Indies. The specimens shown are formed by the female nymphs in which they are encysted and often remain a long period. They are very common on newly cleared land. Heavy rains carry immense numbers to the shore, where they are frequently gathered with sea-shells and often strung as beads for necklaces, etc. This species was described by Guilding (Trans. Linn. Soc., London, 1833, p. 115, pl. 1) as a parasite of ants, but it is probable that their relation to the ants is similar to that of other Coccidæ. A species *M. vitum,* is described by Mayet (Ann. Soc. Ent. France, 1896. p. 419) as infesting the roots of the vines in Chili. Prof. Wheeler called attention to a new species of *Margarodes* recently described from southern Europe.

Mr. Johnson referred to a recent paper by Prof. Stein (Wiener Ent. Zeitschr, XXIX p. 11, 1910) on the genus *Fucellia.* A study of all the material at hand from Labrador to Florida, shows only one species, referable to *F. marina* Macq. and not to *F. fucorum* Fallén.

Prof. A. P. Morse gave a paper on "A Hopperdozer for Rough Ground." This was illustrated by drawings of the apparatus which is designed to catch young grasshoppers when they are destructively prevalent as they are at times in New England and where the ground is so rough that any other device of this kind is useless. His suggestion that the plates be covered with "tanglefoot" used for banding trees was discussed by the members.

Mr. Newcomb reported the occurrence of a noctuid moth flying on March 3rd. Dr. Reagh said that he had seen three moths flying on Feb. 22, and on the eighth of March took a specimen of *Phygalia titea.* Mr. Swett remarked on the records of the captures of *Phygalia olivacearia* and said that its occurrence seems to be limited to a few days about March 31st. Mr. Emerton showed two early spring insects, *Chionea valga,* a Tipulid fly with vestigial wings, found on snow at Three Mile Island, Lake Winnipesaukee, N. H., Feb. 21, 1910, and *Capnia pygmæa,* a Neuropteriod insect on snow at Jackson, N. H., Feb. 21.

The meeting then adjourned to the laboratory, where refreshments were enjoyed by all, through the kindness of Prof. Wheeler.

C. A. Frost, *Secretary.*

REVIEWS.

Wheeler, William Morton. Ants, Their Structure, Development and Behavior. 830 pp. XXV+663, figs. 286. New York, 1910, Columbia University Press. The MacMillan Co. $5.00.

It is very rarely that the available literature of entomology has been so enriched by a single contribution as by Professor Wheeler's book on ants, for until its appearance, the general reader, and even the student of entomology, has had no place to go for an accurate digest of the facts relating to this most interesting and important group of insects. The author's extensive contributions to myrmecology during the past decade have rendered him peculiarly fit to undertake this difficult task of presenting the subject both in its zoölogical and psychological aspects, since a very considerable part of the book deals with his own investigations, hitherto scattered, like the other literature of the subject, in a large number of scientific journals.

The subject matter is presented under three main divisions: structure, development and behavior. The last of these occupies by far the larger part of the book, representing the aspect of greatest interest at the present time, as well as the one into which the author's research has principally led him.

There are very complete accounts of the external and internal structure of ants, preceded by an introductory chapter on "Ants as dominant insects." The presentation of their development is supplemented by an extensive chapter of the complicated phenomena of polymorphism and its causes. Following these are chapters on the history of myrmecology and the classification of ants, their geographical distribution, and a summary of the present knowledge concerning fossil ants.

Introducing the chapters on ethological topics is an account of the habits of ants in general and their various types of nests. Following these are taken up the habits of a number of circumscribed groups, each of which illustrates a characteristic mode of life. These are: the Ponerine ants, the driver and legionary ants, the harvesting ants, the fungus-growing ants and the honey ants. Together with these is a chapter on the relations of ants to vascular plants, and following them three chapters on myrmecophilous insects.

A consideration of the compound nests of ants introduces the matter relating to parasitic and slave-making ants which is very full and complete. The last three chapters on the sensations of ants, the instinctive behavior of ants and the plastic behavior of ants deal with the fascinating psychological aspects of myrmecology.

The large series of illustrations are uniformly excellent, and with several appendices on methods, classification, economic importance, and literature, add much to the usefulness of the book.

C. T. Brues.

Code des Couleurs, à l'usage des Naturalistes, Artistes, Commerçants et Industriels. 720 Echantillons de Couleurs classés d' après la méthode Chevreul simplifiée. par Paul Klincksieck, et Th. Valette, Paris. (1908). G. E. Stechert, New York City, Agent.

This is a book of 32 pages of text, and 50 plates, containing 720 blocked colors; a table of ten principal colors in eighteen languages, and a table of contents; the whole making a neat and portable volume. The publication of this book is a great boon to systematic naturalists everywhere, as Ridgway's Nomenclature of Colors for Naturalists, has been out of print for some time, and it has been practically impossible to obtain a copy of it. This book was planned in 1906, through a real need felt in the study and description of Mushrooms; thus it was planned, in part, by a naturalist for naturalists. The hope is expressed that this color code may recommend itself universally, and there is certainly great need of a uniform nomenclature of colors, accepted and used by naturalists everywhere. As the recognition of geographic isolation as a factor in evolution comes to be better known and studied, it is imperative that a close study be made of minute differences in form and color, in order to understand the probable evolution of species or subspecies.

The fundamental colors are six, those of the solar spectrum, and the tones are indicated by a number, the method devised by Chevreul; which is decidedly better than "Se fatiguer pour trouver dans les trois Règnes ou ailleurs le nom d'un équivalent qui lui ressemble plus ou moins vaguement," and "qui ne signifient rien de précis." Every hundred numbers is equivalent to one of the colors of the solar spectrum.

Part II is by Th. Valette, and considers the following subjects:

1. Des couleurs au point de vue physique.
2. Sources de lumière.—Lumières colorées.
3. Des couleurs matérielles ou pigments colorés.
4. Classification des couleurs.
5. Code des Couleurs à l'usage des naturalistes.
6. Confection du Code des Couleurs.
7. Examen des couleurs complémentaires contrastes.

The book ought to be in use by every naturalist, dealing with groups which exhibit color differences, thus helping toward a uniform nomenclature, instead of indicating a color by some vague term, which leaves an idea of uncertainty. Stability in terminology ought to be as important as the rules of nomenclature,— priority, etc., and should be taken up by committees on nomenclature.

Fordyce Grinnell, Jr.

Needham, James G. General Biology; a book of outlines for the general student. pp. xiv; 542, figs. 287. Ithaca, N. Y. 1910, The Comstock Pub. Co. Price $2.00.

Entomologists will be much gratified to see the wide extent to which Professor Needham has drawn upon insects to furnish the material for illustrating many of the biological topics treated in this book. It is intended to serve as a guide for the One-year course in biology as given in most colleges where the work is divided between zoölogy and botany, but the two are not kept separate in the present outline which aims to give a general idea of the broader principles of the evolution, adaption and interrelationship of organisms, rather than the specific morphological studies usually presented to students of this class. Such a presentation should prove attractive to the young college student, particularly if combined with a really enthusiastic teacher.

C. T. Brues.

The Fungus Gnats of North America. By O. A. Johannsen. Bull. 172, Maine Agric. Exp. Sta., pp. 209–276, pls. 3 (March 1910).

This very valuable contribution to American dipterology deals with about half of the North American Mycetophilidæ, a family which has been in great need of revision for many years. Eight subfamilies are recognized of which five, the Bolitophilinæ, Mycetobiinæ, Diadocidinæ, Ceroplatinæ and Macrocerinæ are considered in the present paper. Seventy-one species are recognized and described, belonging to a number of genera, the largest, *Platyura,* having 26 species referred to it.

C. T. Brues.